Petitioning the US to take the lead in space solar power

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Human civilization has been very fortunate to have access to readily available fossil fuels to enable the industrial revolution and the rise of our modern society. However, as most now understand, environmental and energy security concerns have emerged from our substantial use of fossil fuels. Fortunately, America now has the technological means and aerospace industrial mastery needed to lead the world in mitigating these threats by transitioning from fossil fuels to clean, sustainable, space-based solar energy.

The American public now needs to elevate these issues and this solution onto the radar screen of national politics. We need to inform our national leaders that space-based energy will allow our civilization to address concerns about the environmental consequences of the rising atmospheric carbon dioxide concentration; will enable America to achieve national energy security with clean, sustainable energy sources; and will bring substantial science, technology, engineering, and high-tech manufacturing economic growth as a spacefaring industrial revolution kicks-off to build the needed new American space-based power, space mining, and spacefaring logistics industries.

Knowing that almost all American aerospace professionals share the long-held dream of America becoming a true human spacefaring nation, transitioning to space-based energy provides the sound environmental and energy security rationale for now making this dream a reality.

Rob Mahan, founder of Citizens for Space Based Solar Power, has initiated two online petitions: "USA Must Lead the Transition to Space-Based Energy" at change.org and "America Must Lead the Transition to Space-based Energy" at petitions.whitehouse.gov. By signing these two petitions—and please sign both—you are exercising your constitutional right to petition our government to take positive action on the related topics of environmental and energy security by putting the United States in a position to lead an *orderly* worldwide transition to space-based solar power. Knowing that almost all American aerospace professionals share the long-held dream of America becoming a true human spacefaring nation, transitioning to space-based energy provides the sound environmental and energy security rationale for now making this dream a reality.

(Related YouTube video)

Environmental security

Over the last 800,000 years, the normal range of the atmospheric concentration of carbon dioxide has varied from a low of about 180 parts per million by volume (PPMV), during the colder glacial periods, to a high of about 280 PPMV during the warmer interglacial periods. About 18,000 years ago, the current warmer interglacial period began with the concentration about 190 PPMV. This steadily rose to about 270 PPMV by about 12,000 years ago, where it then slowly increased to just above 280 PPMV around 1800 AD—just two centuries ago. Then, with a human population above one billion and a transition to fossil fuels beginning to power the industrial revolution, the concentration steadily grew until it is now above 400 PPMV—about 40 percent higher than normal—with the population standing at about 7.4 billion. This abnormally high carbon dioxide concentration can reasonably be concluded to be due to the growing human population, our impact on the biological environment (e.g., farming), and our increasing consumption of fossil fuels.

Our human civilization depends on a favorable global environment. What is not known with certainty is the relationship between the atmospheric carbon dioxide level and the natural balancing factors maintaining a favorable global environment. Thus, we should act positively on what we do know: that human civilization has pushed the carbon dioxide concentration well above the normal range consistent with past favorable interglacial conditions.

The poorly framed political solution contained in the 2015 Paris Climate Agreement, implementing the 1992 United Nations Framework Convention on Climate Change (UNFCCC), will penalize developed nations by forcing fossil fuel deprivation through laws, regulations, taxes, and energy price inflation. Some politicians even go as far as advocating just shutting down the fossil fuel industries, starting with coal. Clearly, with fossil fuels providing over 80 percent of the modern world's energy, such actions are clearly counterproductive. As the United States experienced during the two imported oil supply crises of the 1970s, such forced energy deprivation only brings personal economic hardship, national economic recession, and political turmoil, consequences unlikely to be embraced in order to implement the Agreement.

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undertake an orderly transition to new, scalable, sustainable energy sources without forced energy deprivation. Setting a goal to complete this global transition by the end of this century is consistent with the time frame for action identified in the Paris Agreement. Hence, the Paris Agreement should be renegotiated to focus on this winning strategy.

US energy security

A simple quantitative fact that cannot be ignored is that the United States is exhausting its supply of technically recoverable fossil fuels. The US Geological Survey estimated in 2010 that the remaining (identified and yet-to-be-discovered) US technically recoverable fossil fuel endowment was about 1,400 billion barrels of oil equivalent (BOE). In 2015, the US consumed about 14 billion BOE of fossil fuels. With a population that will likely grow by 50–100 percent by 2100, the US endowment is unlikely to last to the end of the century, especially as the US becomes fossil fuel energy independent. If ignored, the consequences of this on our children and grandchildren's standard of living and economic prosperity will be very serious. Fossil fuels are not sustainable and our national energy security policy needs to reflect this fact, not blindly ignore this reality.

The only practical alternative to fossil fuels is to move to electrical power produced from manmade or solar nuclear power (e.g., sunlight, wind, hydroelectricity, biofuels, etc.) This electrical power would be used directly, through our electric utilities, and would be used to produce hydrogen and/or synthetic methane to meet industrial, commercial, residential, and transportation needs for a combustible fuel. Each one-gigawatt (GW) of baseload nuclear electrical power, the production of a typical nuclear power plane, will be capable of meeting the annual electrical power and fuel needs for about 100,000 Americans. Thus, on the order of 5,000 to 6,000 GW of baseload electrical power will be needed by 2100 to complete America's transition from fossil fuels.

With the baseline cost per gigawatt for conventional nuclear power and associated hydrogen production in the range of $6–7 billion, the expected cost of transition will be of the order of at least $30–42 trillion. The reality that the scale and cost of the transition is such that it cannot be accomplished quickly—that it will probably take much of the rest of the century to complete—should put to an end the misguided arguments to just abandon fossil fuels. In reality, the American fossil fuel industry will likely need to produce about as much as it did last century while the transition to sustainable energy is completed. Thus, for much of the rest of the century, the American fossil fuel industry will continue, as it has for the last 150 years, to ensure America has adequate supplies of affordable energy. Fortunately, with improved emission control and smart carbon dioxide capture/use technologies, we can reasonably act to minimize carbon dioxide emissions during the transition.

Cross-off terrestrial solutions

For the United States and most other nations, there are no practical terrestrial nuclear or renewable energy solutions. For the world to reach a level of development where the average per capita energy consumption is one-half that of the United States—roughly the level of Germany and Japan—each one gigawatt of baseload electrical power will meet the energy needs of about 200,000 people. With a world population expected to approach 10 billion by 2100, on the order of 50,000 gigawatts of baseload electrical power will be needed, roughly 130 times the nuclear power available today. Clearly, a conventional terrestrial fission or even a fusion nuclear power solution is not feasible. Similarly, the land area required for ground solar or wind energy makes these renewable energy alternatives also not practical for most countries. (For example, the United States would need on the order of 840,000–1,036,000 square kilometers of ground solar farms by 2100, while the entire world would need roughly ten times this area.) Lacking a practical terrestrial solution, we must literally expand our thinking.

Space-based solar power

First patented in 1973, geostationary Earth orbit (GEO) space-based solar power, or simply space solar power (SSP), provides the scalable sustainable energy solution to replace fossil fuels. SSP platforms in GEO will operate almost continuously throughout the year collecting sunlight, converting this to electrical power, and transmitting this power to ground receiving stations to supply electric utilities and produce hydrogen fuel. A typical GEO platform, with a sunlight capture area about the size of Manhattan Island, would provide five gigawatts of baseload electrical power to the utilities. With GEO being nearly 260,000 kilometers in circumference, there is ample room to build the thousands of SSP platforms the world will need by 2100. The United States will need about 1,000 of these five-gigawatt platforms. The US ground receiving stations would require about 130,000 square kilometers, far less than that required for ground solar or wind farms. Space solar power is the way to go for America and much of the rest of the world.

Our national elected leaders are, apparently, unaware of the tremendous opportunity America now has to lead this spacefaring industrial revolution that will open the central solar system to commercial human spacefaring operations.

American aerospace professionals must now lead the way

It should be obvious to all American aerospace professionals that America undertaking space solar power will initiate an American-led spacefaring industrial revolution with a global impact comparable to the steam power revolution of the 1800s, the aeronautical revolution of the 1900s, and the information technology revolution of the last half-century. America must achieve national energy security with sustainable energy. Space

solar power is the only practical path to accomplish this. America must also, by example, lead the world in moving away from fossil fuels in an orderly manner to address reasonable environmental concerns while enabling continued global economic development. Our national elected leaders are, apparently, unaware of the tremendous opportunity America now has to lead this spacefaring industrial revolution that will open the central solar system to commercial human spacefaring operations. By signing the two Citizens for Space Based Power petitions, you can take the first, easy step to help initiate this bright, energy-secure, spacefaring future for our children and grandchildren.

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